DOCUMENT RESUME

ED 444 551 IR 020 207

AUTHOR	Adamy, Peter
TITLE	Using Computers To Enhance Action Research.
PUB DATE	2000-00-00
NOTE	6p.; In: Society for Information Technology & Teacher Education International Conference: Proceedings of SITE 2000 (11th, San Diego, California, February 8-12, 2000). Volumes 1-3; see IR 020 112.
PUB TYPE	Reports - Evaluative (142) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	*Action Research; Computer Mediated Communication; Computer Software; *Computer Uses in Education; Data Analysis; *Qualitative Research

ABSTRACT

This paper outlines the potential benefits of using computers to enhance the action research process for classroom teachers. An argument is made for classifying action research as a type of qualitative methodology. This argument is then used to apply the literature on computer use in qualitative research to its use in action research; advantages of computers for data collection/analysis and validity are summarized. Specific applications of various types of software are discussed in terms of their potential for supporting and strengthening action research efforts, including the use of CAQDAS (Computer Assisted Qualitative Data Analysis Software) for coding and search/retrieval, as well as the increased potential for communication offered by developments in technology. (Contains 12 references.) (MES)

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Using Computers to Enhance Action Research

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G.H. Marks

Peter Adamy
School of Education
University of Rhode Island
United States
adamy@uri.edu

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Abstract: This paper outlines the potential benefits of using computers to enhance the action research process for classroom teachers. An argument is made for classifying action research as a type of qualitative methodology. This argument is then used to apply the literature on computer use in qualitative research to its use in action research. Specific applications of various types of software are discussed in terms of their potential for supporting and strengthening action research efforts.

Introduction

Action research is hailed by its proponents as an effective way for teachers and other classroom practitioners to actively and rigorously examine aspects of an educational environment in order to inform efforts to change current practice or routine (e.g., McKernan, 1991; McNiff, 1997; Stringer, 1999). In form, the action research process is made up of several components that are traditionally seen as hallmarks of qualitative research:

- It is focused on the meanings of participants within an environment, and thus reflects the *–emic* perspective adopted in qualitative studies. This is evidenced by the fact that action research efforts are geared towards change and development for those who are members of the researched community; such an effort is deemed successful when subsequent changes (if any) positively impact the educational experience of those involved (Stringer, 1999).
- The researcher serves as the main measurement instrument. It is the teacher/practitioner who collects, analyzes, and interprets the data, and who ultimately acts on his or her findings.
- The research takes place in a naturalistic setting. For the purposes of this paper, that is presumed to be the classroom.
- In action research, the teacher/practitioner takes on the role of the qualitative researcher and acts as the primary investigator for the study. Typical duties for both types of researcher include collecting, analyzing, and organizing data, as well as making decisions on sampling issues of depth versus breadth (McNiff, 1988).

Because of these similarities in design and method, it is reasonable to classify action research as a qualitative research endeavor. While some professionals balk at any attempt to label action research as "real" research, its structure and methodology do provide an adequate basis for consideration as one variant of the educational research process.

The increased general use of computers during the last several decades has resulted in increased application of their functions and capabilities in the research process. Many qualitative researchers make use of the organization, storage, and retrieval functions of various computer software applications to aid their efforts in making sense of the data they collect (see: Fielding & Lee, 1998; Kelle, 1995; Weitzman & Miles, 1995). Given the argument presented above for classifying action research as a form of qualitative methodology, it is reasonable to assume that similar applications of computer technology will benefit the action research process as well.

The purpose of this paper is to explore the possible uses of computer applications for teachers and practitioners who are conducting, or are interested in conducting, action research projects in their own schools or classrooms. As with the use of computers in qualitative research, computers should be used in action research only in those cases in which their applications can enhance and not replace the research

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process. Accordingly, it is important for those conducting action research to have a clear understanding of how various computer software programs can add rigor to sampling, coding, and hypothesis refinement.

Definition

The action research process is applicable to many areas in which participants in a context or members of a community wish to analyze their practice and the ways in which members mutually influence the action of others. At the most basic level, the main goal of such analysis is to inform efforts to effect positive change in an organization or community. Stringer (1999) and Zeichner & Gore (1995) demonstrate the application of action research principles in both community and educational settings. However, their approach is focused on its potential as a social reconstructionist process aimed at empowerment and social justice. For the purposes of this paper, action research is defined as a method of educational, qualitative research in which teachers and practitioners rigorously examine their own practice in an effort to improve their teaching and communicate their findings to colleagues.

Computers and Qualitative Research

The application of computers to qualitative research efforts can be seen as a merging of incompatibilities. Bogdan & Biklen (1998) state that qualitative research deals with "soft" data that is primarily composed of "description of people, places, and conversations, and not easily handled by statistical procedures" (p. 2). Computers on the other hand, are generally classified according to their numerical nature and ability to process quantitative data rapidly. When the two are joined in the research process, a contradiction can arise in which some fear the loss of the inherent artfulness and humanity of qualitative methodology, while others fear the loss of rigor in the analysis process (Hesse-Biber, 1995). While this contradiction is far from trivial, it is not prohibitive to productive use of the computer's potential for enhancing research efforts. There are some specific, useful features of computer software that can aid the action researcher in some of the more basic functions of qualitative research.

Data collection and Analysis

The lack of regular, systematic tests and measurement instruments in qualitative research places the focus of data collection and analysis on the researcher. He or she is responsible for ensuring the collection of adequate amounts of data that most accurately represent what is happening in the context of a study. They are simultaneously charged with analyzing that data in a way that most clearly and accurately represents the meanings of phenomena and contexts for participants.

This notion of the researcher as instrument in qualitative methodology is particularly applicable to action research, as it is the researcher's own environment and practices that are analyzed. This places particular emphasis on the context of any action research study. Tesch (1990) describes the process of de-contextualizing and re-contextualizing data that is inherent in all qualitative data analysis, and which can be aided by the use of computer software. The first step in this process is the segmentation of relevant chunks of data that are coded and subsequently separated out of the data corpus. This is done in such a way as to ensure that the chunks retain meaning once they are separated. It is then the task of the researcher to re-assemble these pieces into meaningful categories in "data documents". Connections are then made between these documents that represent and support a theory of the phenomenon under study. Tesch argues that Computer Assisted Qualitative Data Analysis Software (CAQDAS) can aid this process through its increased capacity for archiving and organizing data. In essence, CAQDAS is much more efficient at the traditional tasks of cutting, pasting, organizing, and retrieving data as it is de-contextualized and subsequently re-contextualized according to the design of the researcher. Since the average teacher as action researcher is not rigorously trained in research methodology, this particular functionality of CAQDAS programs can help them more efficiently organize what might otherwise be an intimidating amount of data in a way that is not necessarily familiar to them.

Validity

In their ability to aid the researcher in processing larger amounts of data more efficiently, computers and CAQDAS programs help address common criticisms leveled at the validity of qualitative research findings. The complaints that qualitative research is subjective, not rigorous, not systematic, and narrow in its sampling can be countered to a certain extent with the use of computers for the research process. CAQDAS makes it possible to collect, organize, and manage much larger amounts of data from a greater number of subjects than was previously possible for human researchers. It is also possible to be more systematic and accurate when coding using the search and retrieval capabilities of many CAQDAS programs.

In action research, validity is tied to three key elements (McNiff, 1997): Self-validation, peer-validation, and learner validation. In essence, the action research process can be considered valid if it adequately enhances the learning process and environment for teachers, their colleagues, and their students. Triangulation of these three perspectives strengthens the validity claims of any action research study (McKernan, 1991). As discussed below, advances in computer technology have greatly enhanced the ability to record and communicate multiple perspectives among participants, thus increasing an action researcher's ability to achieve this type of triangulation.

At the same time, Seidel (1991) warns of the danger of becoming too enamored of the ability to process large amounts of qualitative data with computers. He argues that is possible for qualitative researchers to fall victim to the illusion that their research is more scientific in nature simply because they are using larger sample sizes. He points out that in some cases, single subjects and/or single occurrences of phenomena are more significant than occurrences across large groups. Ultimately, he argues, while it is advantageous to be skilled in the use of computers for qualitative research, it is equally important to be aware of what the applications can and can not do, as well as how they can be misapplied to the research process (see also: Hesse-Biber, 1995; Kelle & Laurie, 1995). In the following sections, appropriate applications of computers and CAQDAS programs for action research are discussed.

Productivity Tools

For most teachers time is precious. While the concept of examining one's practice, reflecting on that examination, and taking action to improve the learning process is attractive to those who are committed to education, it is also a time-consuming practice. As a result, action research involves a significant commitment of time and effort. When computers, and especially CAQDAS programs, are added to the mix, the amount of time required can increase dramatically due to the learning curve that is inherent in many computer applications.

It is therefore important for action researchers to consider those computer resources that already exist in their environment, and how they might be applied to the research process. In most cases, those resources will include some basic productivity software tools that are standard issue with most computers purchased in today's market.

Databases and spreadsheets are non-specialized programs that can be used to efficiently store, organize, and present data. They have the advantage of being two of the most commonly used software applications, which increases the likelihood that experienced users can readily be located locally to assist researchers who are not familiar with their capabilities. Spreadsheets are particularly advantageous because of their ability to save and import data as delimited text. This facilitates the transfer of certain data configurations between several types of computer software applications (e.g., spreadsheets, word processors, *SPSS, QSR NUD*IST*, etc.).

While there are specialized programs such as *Inspiration* that are designed to facilitate the visual display of qualitative data (see: Miles & Huberman, 1994), standard draw and paint programs can be used to achieve similar types of display. This eliminates the need for action researchers to learn an entirely new software package, and allows them to use an application that they are most likely using with their students already.

CAQDAS Software

If an action researcher is committed to using software that is specific to qualitative research, there are a number of specialized packages that can enhance and facilitate the basic tasks they must accomplish in the analysis process (e.g., *QSR NUD*IST, Atlas/ti, FolioViews, HyperQual, HyperResearch, The Ethnograph*). In most cases, these programs require a significant investment of time to become familiar and comfortable with their basic functionality. However, they have the advantage of providing some very powerful tools for data analysis.

Coding

A basic function of all CAQDAS program is the ability to assign codes to chunks of data. An advantage to doing this on the computer is the ability to create, assign, and keep track of a greater number of codes than would be humanly possible using pencil and paper. At the same time, when dealing with fewer codes and more manageable amounts of data, the organizational functionality of CAQDAS programs can still outperform human ability, thus freeing the researcher to concentrate more on analysis and less on organization. In most packages, the creation, naming conventions, and organizational scheme for coding is flexible. This allows the researcher to have increased ownership of the analysis process, and to proceed in a manner that is most intuitive to them. For action researchers, this alleviates the need to stick to formal classification and hierarchical organization schemes that may not be familiar to them, and allows them to structure the coding process to fit their needs and abilities.

Search and Retrieval

A second basic function of CAQDAS programs is the ability to search for specified strings or patterns, and to retrieve and display the results of such searches. As the analysis begins to take shape within the software program, the individual researcher becomes intimately grounded in his or her original data, the coding schemes they have identified and used, and patterns that begin to emerge as the process moves forward. The ability to search for occurrences of single or multiple codes helps the researcher to explore relationships between concepts and phenomena, and to then reorganize those patterns and relationships into an explanation of what they have found.

The action researcher who chooses to use such CAQDAS programs for data analysis can take advantage of this functionality to formulate and examine hypotheses about their practice. One of the key elements of action research is the ability to gain a new perspective on personal practice. The rigorous organization and analysis of data within this type of software can help the action researcher to explore their practice more deeply, to formulate hypotheses that are grounded in their data, and, ideally, to gain new insights into how they can improve what they are doing in the classroom.

Communication

At the most basic level, action research is a social process (McNiff, 1997; Stringer, 1999). In opposition to traditional scientific research, action research is concerned less with an objective, primary investigator and more with a practitioner who is invested in the inquiry into his or her own practices. The successful action research study moves forward only as the researcher gains insight into and understanding of his or her practice (McNiff, 1997). It is a process that is validated through the exploration of different perspectives, and built upon successful communication between all the members within a community or context (Stringer, 1999).

In recent years, developments in technology have greatly increased the potential for easy, inexpensive communication over long or short distances. For the action researcher, this provides an excellent avenue for the sharing and comparison of different opinions, perspectives, and findings. Tools such as electronic mail, electronic mailing lists, online newsgroups, web sites, and video conferencing can

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all be used to communicate with colleagues during the research process. This type of technology is particularly valuable for communication across distances and in an asynchronous mode. Given the restrictive daily schedule required of most teachers, it is not always possible to find common times for meeting and sharing ideas or findings. The ability to post and retrieve information online at any time permits communication on a more flexible basis.

Conclusion

At a basic level, action research is designed to benefit practitioners who are not professional researchers. In the process of conducting action research, teachers have the opportunity to take an in-depth look into their educational practices in a way that is illuminating and, ideally, transforming for themselves and the members of their communities of practice. Computers, and specifically CAQDAS programs, can serve as tools for the action researcher that can simultaneously simplify and enhance the research process. As teachers approach action research with a plate that is already overflowing, CAQDAS offers a way to support them in their new role as researchers, and to lend credibility to their efforts, which can ultimately help ensure their continued participation in this type of critical, self-evaluation.

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